Florida LID Workshop Watershed Plan

Project Information	
Project Name:	Florida LID Workshop
Project Address:	St. Augustine, FL
Contact Information:	
Watershed Information	
Description:	
Total Site Area (Ac):	
Total Baseline Impervious Area (Ac):	
River Basin:	
Regulatory Watershed:	
Precipitation Data	
Design Storm Frequency (yr):	1
Design Storm Duration (hr):	24
Precipitation Depth (in):	3.92
2-Year, 24-Hour Rainfall (in):	4.56
NOAA's National Weater Service Website	
Hydrograph Data	
Rainfall Distribution Type:	Type III
Time Interval (min):	5

Baseline Conditions

Description:

Total Drainage Area (ac): 100.00

HSG	Land Use	CN	Area (acres)	%
Land Use				
B	Open Space	61	55.00	55%
B	Open Space	61	45.00	45%
User Defined Land Uses				

Baseline Composite Curve Number = 61

Baseline T_c

User Defined T_c (hours): 0.12

OR

Sheet Flow	
Length (ft):	
Slope (ft/ft):	
Surface Cover:	
Manning's n-value:	
T_t (hrs):	
Shallow Flow	
Length (ft):	
Slope (ft/ft):	
Surface Cover:	
T_t (hrs):	
Channel Flow	
Length (ft):	
Slope (ft/ft):	
Manning's n-value:	
Flow Area (ft^2):	
Wetted Perimeter (ft):	
T_t (hrs):	

Baseline T_C = 0.120 hr

Goal #1 Conditions

Description:

Total Drainage Area (ac): 100.00

HSG	Land Use	CN	Area (acres)	%
Land Use				
B	Impervious	98	70.00	70%
B	Open Space	61	30.00	30%
User Defined Land Uses				

Goal #1 Composite Curve Number = 87

Goal #1 T_c

User Defined T_c (hours): 0.12

OR

Sheet Flow	
Length (ft):	
Slope (ft/ft):	
Surface Cover:	
Manning's n-value:	
T_t (hrs):	
Shallow Flow	
Length (ft):	
Slope (ft/ft):	
Surface Cover:	
T_t (hrs):	
Channel Flow	
Length (ft):	
Slope (ft/ft):	
Manning's n-value:	
Flow Area (ft^2):	
Wetted Perimeter (ft):	
T_t (hrs):	

Goal #1 T_C = 0.120 hr

Goal #2 Conditions

Description:

Total Drainage Area (ac): 100.00

HSG	Land Use	CN	Area (acres)	%
Land Use				
B	Impervious	98	50.00	50%
B	Open Space	61	50.00	50%
User Defined Land Uses				

Goal #2 Composite Curve Number = 80

Goal #2 T_c

User Defined T_c (hours): 0.12

OR

Sheet Flow	
Length (ft):	
Slope (ft/ft):	
Surface Cover:	
Manning's n-value:	
T_t (hrs):	
Shallow Flow	
Length (ft):	
Slope (ft/ft):	
Surface Cover:	
T_t (hrs):	
Channel Flow	
Length (ft):	
Slope (ft/ft):	
Manning's n-value:	
Flow Area (ft^2):	
Wetted Perimeter (ft):	
T_t (hrs):	

Goal #2 T_C = 0.120 hr

Goal #3 Conditions

Description:

Total Drainage Area (ac): 100.00

HSG	Land Use	CN	Area (acres)	%
Land Use				
B	Impervious	98	40.00	40%
B	Woods	55	60.00	60%
User Defined Land Uses				

Goal #3 Composite Curve Number = 72

Goal #3 T_c

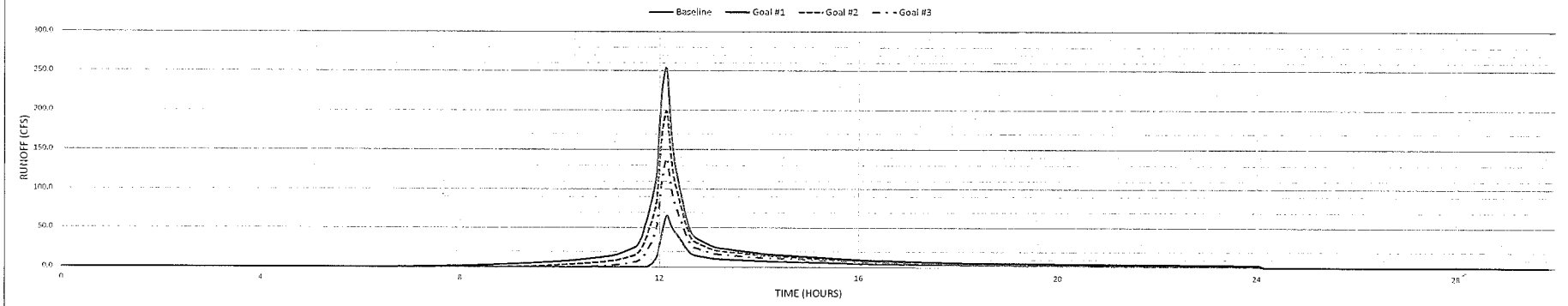
User Defined T_c (hours): 0.12

OR

Sheet Flow	
Length (ft):	
Slope (ft/ft):	
Surface Cover:	
Manning's n-value:	
T_t (hrs):	
Shallow Flow	
Length (ft):	
Slope (ft/ft):	
Surface Cover:	
T_t (hrs):	
Channel Flow	
Length (ft):	
Slope (ft/ft):	
Manning's n-value:	
Flow Area (ft^2):	
Wetted Perimeter (ft):	
T_t (hrs):	

Goal #3 T_C = 0.120 hr

Pre-Treatment Runoff Hydrographs



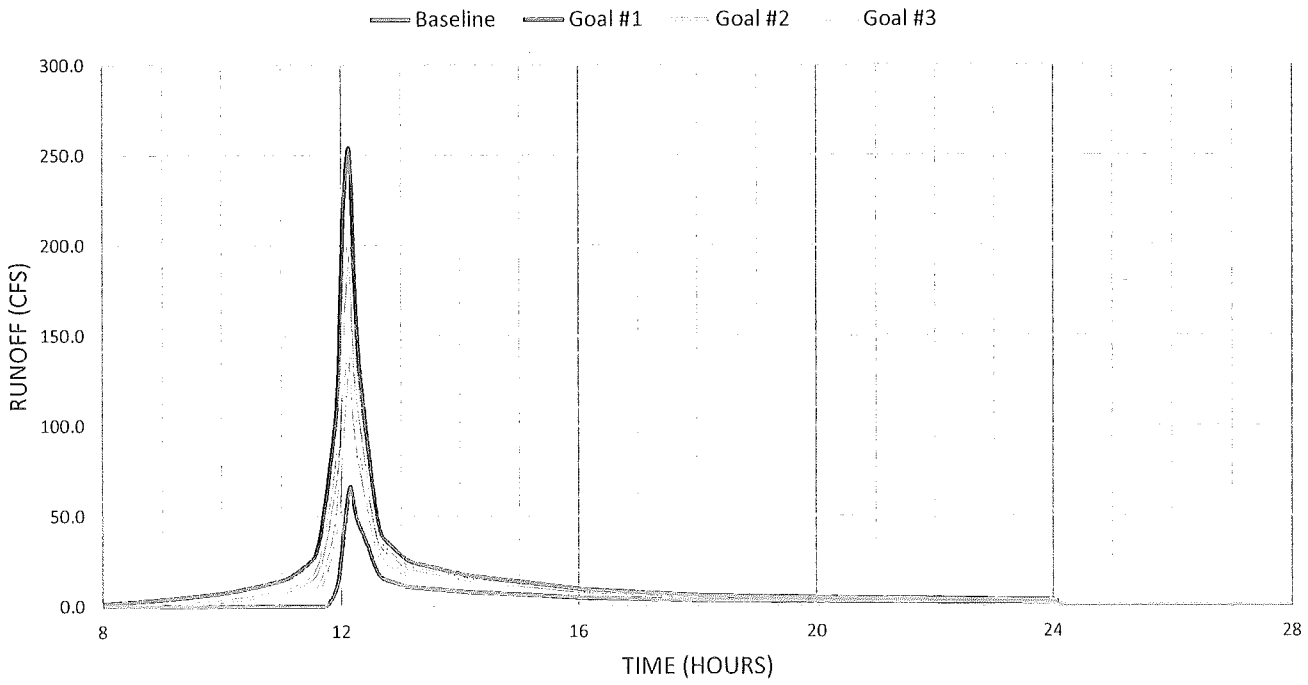
Baseline Peak Flow =	66.35 cfs	**Goal #1 Peak Flow =**	254.07 cfs	**Goal #2 Peak Flow =**	198.83 cfs	**Goal #3 Peak Flow =**	139.12 cfs
Baseline Runoff Volume =	6.44 ac-ft	**Goal #1 Runoff Volume =**	21.38 ac-ft	**Goal #2 Runoff Volume =**	16.48 ac-ft	**Goal #3 Runoff Volume =**	11.72 ac-ft

Florida LID Workshop Volume Reduction Measures

Total Drainage Area (ac):		100.00	
Device Type	**Storage Volume (ac-ft)**	**Soil Type**	**Volume Reduction (ac-ft)**
Volume Reduction From Scenario Tool =			

Total Volume Reduction: **0.00 ac-ft**

Post Volume Reduction Runoff Hydrographs



CURVE NUMBERS

Land Use	HSG			
	A	B	C	D
Impervious	98	98	98	98
Open Space	39	61	74	80
Woods	30	55	70	77

TIME OF CONCENTRATION CALCULATIONS

$$T_t = T_{t1} + T_{t2} + T_{t3} + \ldots T_{tm}$$

T_c = time of concentration (hr)

m = number of flow segments

Sheet Flow Surface Conditions Table 3-1, TR-55

Surface Description	Manning's n
Smooth Surfaces	0.011
Fallow (No Residue)	0.05
Cultivated Soils (Residue Cover <20%)	0.06
Cultivated Soils (Residue Cover >20%)	0.17
Grass - Short Prairie	0.15
Grass - Dense	0.24
Grass - Bermudagrass	0.41
Range (Natural)	0.13
Woods (Light Underbrush)	0.4
Woods (Dense Underbrush)	0.8

Sheet Flow Calcuations (Less than 300 feet)

$$T_t = \frac{0.0007(nL)^{0.8}}{(P_2)^{0.5} s^{0.4}}$$

T_t = travel time (hr)

n = Manning's roughness coefficient (Table 3-1)

L = flow length (ft)

P_2 = 2-year, 24-hour rainfall, 3.6 inches

s = slope of hydraulic grade line (land slope, ft/ft)

Shallow Flow Calculations TR-55

Paved : $V = 16.1345(s)^{0.5}$

Unpaved : $V = 20.3282(s)^{0.5}$

V = Average Velocity (ft/s)

s = slope of hydraulic grade line (watercourse slope, ft/ft)

$$T_t = \frac{L}{3600V}$$

T_t = travel time (hr)

L = flow length (ft)

V = Average Velocity (ft/s)

3600 = seconds to hours conversion factor

Channel Flow Calculations TR-55

Surface Description	Manning's n
Asphalt	0.016
Concrete, finished	0.012
Concrete, unfinished	0.014
Grass	0.035
Gravel Bottom/riprap sides	0.033
Weeds	0.040
Other	

$$V = \frac{1.49 r^{2/3} s^{1/2}}{n}$$

V = Average Velocity (ft/s)

r = hydraulic radius (ft)

s = slope of hydraulic grade line (channel slope, ft/ft)

n = Manning's roughness coefficient for open channel flow

$$r = \frac{a}{p_w}$$

r = hydraulic radius (ft)

r = cross sectional flow area (ft^2)

pw = wetted perimeter (ft)

$$T_t = \frac{L}{3600V}$$

T_t = travel time (hr)

L = flow length (ft)

V = Average Velocity (ft/s)

3600 = seconds to hours conversion factor